EXHIBIT
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Forensic Building Science, Inc.

Storm Damage Report

for

El Nacional Spanish Newspaper
304 SW 25th Street
Oklahoma City, OK 73109

LICENSED PROFESSIONAL ENGINEER
BRIAN CRAIG JOHNSON
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OKLAHOMA

UNVERIFIED

September 23, 2015

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Client: Voss Law Firm

Project Address:
El Nacional De Oklahoma Newspaper
304 SW 25th Street
Oklahoma City, OK 73109

Oklahoma County.

Insurance Carrier: Travelers Casualty Insurance Company Policy # I-680-4B404861-ACJ-13.
Insurance Claim #: EXC9168.

FIELD REPORT FOR INITIAL STORM DAMAGE INVESTIGATION

1.0 **Background Information:**

1.1 Forensic Building Science, Inc. was contacted by Voss Law Firm to provide an inspection of the interior and exterior of the above-mentioned property to ascertain the extent of damage caused by hail/wind, which was reported to have occurred on or around May 31, 2013.

Reference information on storm: [not numbered]

- 1.25" hail approximately 6 miles west of this property: http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=453624
- 1.0" hail approximately 9 miles northwest of this property: http://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=453620
- NOAA Storm Report Summary: http://www.srh.noaa.gov/oun/?n=events-20130531-stormdata
- Weather Underground Summary for May 31, 2013: http://www.wunderground.com/history/airport/KPWA/2013/5/31/DailyHistory.html?req_city=Oklahoma+City&req_state=OK&req_statename=Oklahoma&reqdb.zip=73101&reqdb.magic=1&reqdb.wmo=99999

- NOAA Severe Weather Data Inventory, www.ncdc.noaa.gov/swdi.

Episode narrative from report 453624
A tornado outbreak occurred during the late afternoon and early evening hours of the 31st. A stalled front and deeply mixed dryline served as a focus for

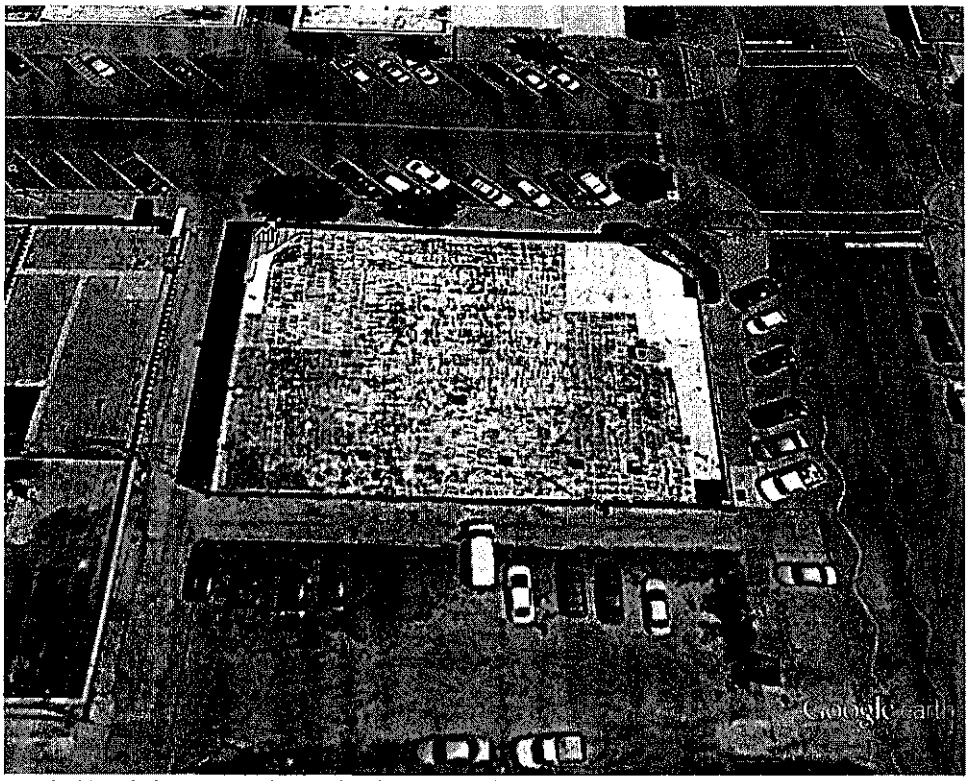
thunderstorm development. The front/dryline triple point was where the most intense supercells initiated. These storms traveled eastward, eventually impacting the Oklahoma City metropolitan area. Several tornadoes occurred, including the El Reno tornado, which unfortunately claimed several lives. In addition to the tornado, very large hail and heavy rains led to flash flooding in Oklahoma City. This flash flood event ranked as one of the worst in Oklahoma City history in terms of fatalities and damages to property. The event lasted well into the overnight hours.

1.2 A site specific hail report by HailWatch (generated July 21, 2015) was reviewed. The dates listed in the report extend from January 1, 2006 to July 20, 2015. The following data is listed in the report:

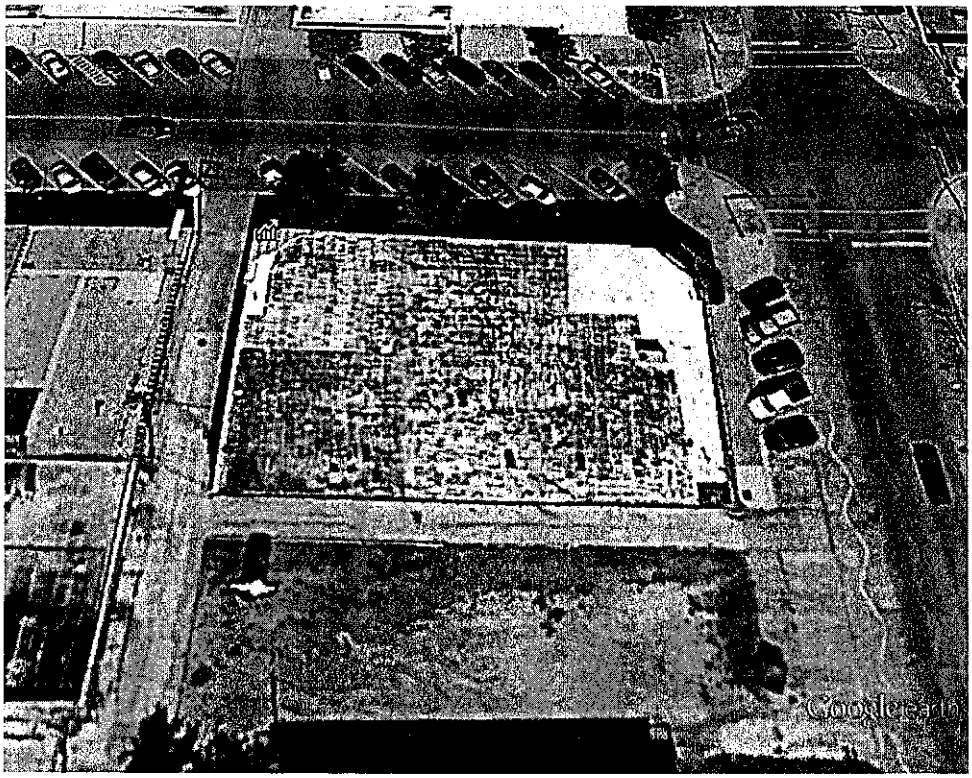
Hail – 1.0" diameter hail was reported at the property on May 31, 2013. Hail of 1.3" diameter within 1 mile and 1.3" diameter within 3 miles of the property was also reported on the same date.

Hail 0.75" and larger at the property is indicated on the following dates:

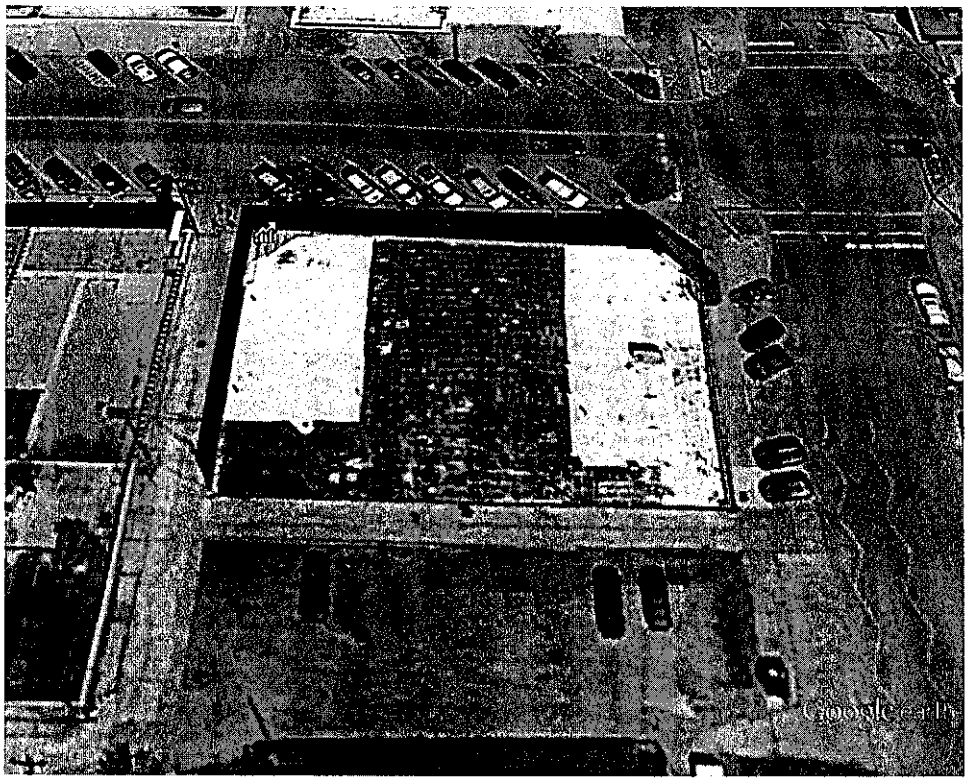
- 1.4" on May 26, 2015
- 0.8" on May 6, 2015
- 1.0" on May 7, 2014 (partial recoat in March 2015 following)
- 0.8" on April 13, 2014
- 1.0" on May 31, 2013 (date in question)
- 1.1" on May 20, 2013
- 0.9" on April 22, 2013
- 0.8" on January 29, 2013
- 1.5" on May 29, 2012 (roof coated w/ elastomeric Oct 2011).
- 0.8" on May 19, 2011
- 1.4" on May 16, 2010
- 0.8" on May 1, 2008



Google Earth imagery date 5/21/2013, before storm



Google Earth imagery date October 5, 2013, after storm



Google Earth imagery date March 25, 2015.

Forensic Building Science visited the site to take photos and document damaged locations. These photos are attached to this report.

1.3 Forensic Building Science personnel present for the inspection:

- Tom Irmiter, President (June 8 and 9, 2015).

1.4 The following documents have been received:

- K Simon Construction – El Nacional Spanish Newspaper – Photo Exhibit with 95 photos, September 29, 2014
- K Simon Construction – Estimate of damages in the amount of $522,038.14, November 5, 2014
- K2 Consulting and Services, LLC – Estimate with photos taken by K Simon Construction – 95 photos – Estimate in the amount of $402,161.06, September 29, 2014
- Travelers Casualty Insurance – Estimate of damages in the amount of $2,159.63, June 16, 2013
- Vertex Construction Services, Inc. – Roof damage assessment containing 36 photos, July, 8, 2013
- Salazar Roofing & Const. – Estimate in the amount of $73,950.00, October 21, 2013

1.5 According to the Oklahoma County Assessor website, the 12,006 ft^2 structure was constructed in 1946.

1.6 The building is a single story with a partial basement

1.7 Exterior wall finishes consist of brick on all four sides.

1.8 Satellite imagery review

A review of Google Earth satellite imagery starting in 2010 shows the following:

- Prior to October 12, 2011 a white elastomeric coating was installed over the existing BUR roof.
- Prior to August 9, 2012 a section of roof over the offices looks to have been recoated with same materials.
- Prior to May 21, 2013 one small section above the main entrance and along left side (looking south), and one section on the front alley side appear to have been recoated with the same materials.
- Prior to May 3, 2015, two large sections of roof encompassing approximately ½ of the total roof appears to have been recoated.

1.9 At the time of our inspection, a temporary repair was in process. Black sealant and a metal cap were applied to the elevated parapet wall above main entrance. Approximately ½ of the roof had been recoated with an Elastomeric coating after the event and prior to our inspections.

Previous or Subsequent Damage from Other Events: Some delamination of Elastomeric coating could be from 2015 event. Impact on new flashing cap at upper parapet above entrance from 2015 event. Some delamination of painted surfaces could be from 2015 event.

1.10 The following additional documents were used for reference:

- 2009 International Building Code
- 2009 International Energy Conservation Code
- 2000 International Plumbing Code
- 1996 International Mechanical Code
- Photographs from site visit by Forensic Building Science
- Haag Education, Haag Certified Roof Inspector Program, Commercial Edition
- ARMA technical bulletin 115, The Effects of Ponding Water.
- SPRI, Construction-Generated Moisture and Its Effect on Roofing Systems, August 2008.
- ASTM E2268-04(2011) Standard Test Method for Water Penetration of Exterior Windows, Skylights, and Doors by Rapid Pulsed Air Pressure Difference.
- ASTM E2128-09a Standard Guide for Evaluating Water Leakage of Building Walls.

1.11 Inspection Notes

- Area is surrounded by single story commercial/industrial properties inconsistent with the definition of Exposure B in ASCE 7. This property falls in Exposure C in ASCE 7.
- Small areas of pooled water on the roof. Rain in the area less than 48 hours prior.
- Roof substrate is precast "C' plank on open web joists.
- Roofing type: Smooth built-up roof (BUR) with elastomeric coating, manufacturers unknown. Mod-bit single ply membrane on one corner (Photograph 8, Vertex), asphalt shingles on canopy/awning.
- Vitrified clay parapet caps (Figure 48 7/8/15).
- Impact damage to metal coping (Figure 51 7/8/15).
- Impact damage on metal roof penetrations (Figure 80 7/8/15), worse compared to Vertex Photograph 25).
- Dislodged metal parapet cap flashing, new condition (Figure 52 7/8/15).
- Parapet triple wythe brick (Figure 54, 7/8/15).
- Multiple HVAC units on roof (e.g. Figure 68, 7/8/15). Impact damage (e.g. Figure 62, 7/8/15). Spatter (Figure 75, 7/8/15).
- Chipped paint consistent with hail strike (Figure 71, 7/8/15).
- Impact damage to membrane and elastomeric coating (Figure 106, 7/8/15).
- Impact damage to membrane (Figure 108, 7/8/15).
- Bruised membrane (Figure 109, 7/8/18), note white coating present in alligator cracks.
- Reglet and flashing style roof penetration at chimney (Photograph 19, Vertex).
- Mod-bit as flashing at roof parapets.
- Roof parapet 24" ±, newer metal coping on front and left. Clay tile on right elevation (looking south). Tile impact damage (Figure 3, 7/9/15).

2.0 **Site Observations:**

2.1 The building has a low-slope roof covered with smooth (flood coated) built up roof (BUR) with an elastomeric coating. See discussion of historical satellite imagery above. Roof drains to gutters on one elevation, the other three sides have short (12"-24" ±) parapets constructed of triple wythe brick. There is a small pop-up roof on the NW corner covered in mod-bit membrane that is sealed with roofing mastic, and a small shingled roof awning over the front entrance.

2.2 Hail impact damage was noted as indicated above to the majority of the roof coverings and roof penetrations, including flues, HVAC units, tile parapet caps, and the membrane.

2.3 **Roof cores:**

2.3.1 Two roof cores were cut into the roof to determine the composition of the roof and to inspect for signs of water intrusion. Locations were selected using a Tramex roof and wall scanner (a relative scanner) after calibrating it at an area judged to be dry.

2.3.2 Roof core #1 was taken on July 9, 2015, at a location 12' downward of a suspected hail strike (indentation, fracture, and loss of elastomeric roof coating, high relative reading on Tramex (maxed out, See Figure 73). Core was taken 90 feet from right edge and 17 feet from front (Commerce St.) The composition of the roof was as follows:

- Water escaped roof during cutting (Figure 75, 7/9/15).
- Built up roof material that was visibly and physically wet through all layers of the built up material (Figure 76).
- Membrane was soft and debonded (Figure 79).
- The base was flaked (Figure 78).
- The roof deck material consisted of concrete deck (Figure 82).
- Note: There was no insulation in the roof core.

2.3.3 Core cut #2 was taken 31 feet from the front and 3 feet from the Harvey Street side of roof.

- The core was visibly and physically wet through all layers of the built up material (Figure 87).
- It was soft and debonded (Figure 86).
- Materials are wet (Figure 88).
- The roof deck material consisted of concrete deck. Water in the hole. (Figure 89).
- Note: There was no insulation in the roof core.

2.4 Interior

- Ceiling tiles have water stains
- Attic insulation wet in areas above stained ceilign tiles. Insulation water damaged
- Water damage to plaster and gypsum board ceilings and ceiling tiles
- Water damage to wall(s)

Note: See discussion below regarding Vertex report.

2.5 Infrared Scanning and Moisture Mapping

Roof assembly moisture mapping was done using both a Tramex roof scanner and a FLIR infrared camera. The Tramex was positioned on the highest point of the roof slope at a location away from the perimeter and roof flashings, to establish a base line for purposes of calibrating the scanner [See Figure 84-85 TJI Photo Report July 8, 2015]. Once a base line for dry conditions was established the scanner was moved to various locations to collect readings for comparison purposes. These areas read wetter or dryer compared to the established baseline. In addition, an Infrared camera was used to select a calibration point for the Tramex scanner and to locate anomalies with high and low roof scanner meter readings. Based on readings taken on both July 8 and July 9, 2015 core cuts were done at two locations where both anomalies consistent with probable water accumulation and high reading with the moisture meter occurred.

2.6 As indicated in the thermal scanning and the roof moisture scanning, and confirmed by the roof cores, wet areas are present on the roof where water is present under the membrane.

2.7

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3.0 **Review of Report by "Vertex Engineering":**

3.1 "Vertex Engineering" inspected the property on June 21, 2013 and produced a report dated July 8, 2013. The report is signed by D.H. Watson, P.E. and Matt Click, A.I.A., G.C. There are no engineer stamps on the document, and we were unable to locate a certificate of authority for this company to offer either architectural or engineering services. There is a Dudley H. Watson licensed as a P.E. in Oklahoma, but it is not clear this is the same individual. We were unable to locate an architectural license for anyone with the last name Click.

3.2 **Note:** KOKC weather station indicates 1.06" of rain on June 17, 2013 ending in the morning, and no rain up to the date of inspection.

(http://www.wunderground.com/history/airport/KOKC/2013/6/17/WeeklyHistory.html?&reqdb.zip=&reqdb.magic=&reqdb.wmo=)

3.3 Vertex's comments are listed below in italics. Our comments are listed below each paragraph:

3.0 METEOROLOGICAL DATA

Vertex researched reports of weather history from the NOAA National Weather Service National Climatic Data Center (NCDC) (http://www.ncdc.noaa.gov/stormevents) and from Weather Underground (http://www.wunderground.com/history) for Oklahoma County on the reported storm date May 31, 2013. The NCDC permanent database is only complete through March 31, 2013. However, since the NOAA only reports hail of 1 inch or larger size, there are no official reports of hail in Oklahoma County for the period surrounding May 31, 2013.

Source: Vertex report.

Vertex indicates the NOAA/NCDC did not have final data on that web site. The NOAA storm prediction center (SPC) is the typical source for "early" information on hail and storms and was not consulted in contravention of typical care. The statement "there are no official reports of hail" on the date and surrounding is technically true as SPC information is not final, but the statement is nonetheless misleading. SWDI (Severe Weather Database Inventory) can also be consulted for early information.

The following link should indicate significant wind and hail in Oklahoma county on the May 31 to June 1 2013 period (winds up to 83 knots, hail between 1" and 1.25" diameter reported).

http://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=ALL&beginDate_mm=05&beginDate_dd=26&beginDate_yyyy=2013&endDate_mm=06&endDate_dd=25&endDate_yyyy=2013&county=OKLAHOMA%3A109&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=40%2COKLAHOMA

The existence or lack of weather information must be viewed in tandem with the on-site inspection of the property, it appears that the "lack" of weather information prejudiced Vertex's on-site inspection process. No historical information on previous weather or hail events appears in the report, either.

3.4 *Based on our observations, with a reasonable degree of certainty, it is our opinion there is no hail damage to the roof of the building resulting from the May 31, 2013 storm. There is no evidence of hail impact marks on the BUR or on the white coating. Also, there are no hail impact marks on the exposed surfaces of the modified bitumen rolled roofing materials, indicating there is no hail damage to those surfaces. Damaged places on the coating are the result of mechanical impacts and other effects such as foot traffic on the roof.*

Forensic Building Science comment(s):

The overall statement here is false. At minimum, damage to the roof exists in the form of dented roof metals and damaged HVAC units. While we agree that there is some mechanical damage, we found numerous impact marks related to hail damage. The mod-bit roof is relatively small compared to the main roof surface. There is also no indication Vertex inspected the shingled roof over the awning.

3.5 *With orange cones we looked for and marked several places on the roof of reported hail impacts. The pattern of reported impact damage was congregated mostly in and around the areas where HVAC contractors would have walked and carried tools and gear when servicing the HVAC equipment. There were very few marks on the northerly areas of the roof. The configuration of impact type damage, as observed by the placement of cones, does not represent a typical hail pattern that would normally occur on a roof surface of this size.*

Forensic Building Science comment(s):
"[R]eported hail impacts" leads us to believe these areas are selected someone other than Vertex., i.e. Vertex did not perform their own inspection, merely looked at areas suggested by another party. Further, there is no effort to match "mechanical damage" on the membrane to the interior damage below.

3.6 *Based on our experience, hard hailstones at least 2 inches in size are necessary to fracture the membranes of a BUR roof system and/or mod-bit roofing material. There is no data or physical evidence to substantiate hail fall of the size and solidity that would be required to fracture the roof surfaces and cause water leaks into the building. Even though there is confirmation that the roofs were likely exposed to hail on the reported storm date, the impact marks observed were not of the typical shape and type that resemble strikes from hail fall. There is no evidence the hail was large enough, hard enough, and/or fell with enough velocity to damage the roof membranes or the white coating.*

Forensic Building Science comment(s):
Traditional hail impact testing is performed on new building products and not on roof materials that have been in place for several years. The ability for a roof of this type to resist impacts from hail declines as the material ages. Weather records for hail size are not always the most accurate and it is possible for larger hail to fall in an area where only smaller hail has been reported. Indentations on the soft metals were consistent with varying sizes of hail including large very large hail. [See K Simon Construction Photo # 3433 taken 9-21-2014]. While the typical hail damage threshold for new smooth BUR lines up with that presented in the Haag Commercial Course Book (minus the "hard hailstones" proviso Vertex adds here), the value for Mod-bit is 1 ½" to 2" in that document. Haag is silent on the hardness of hailstones.

As shown in Attachment 3, the latest built-up roof overlay was completed without the application of a barrier to ultraviolet rays of the sun. Sun and rain weathers and deteriorates asphaltic impregnated roofing membranes and the asphaltic top flood coat that usually comprises a BUR. As reported, the BUR was on the building for approximately three years before it was covered with the white

coating. The flood coat of the BUR contracted and shriveled in an alligator cracking pattern during the time it was exposed to the weather. It is probable that minute openings ensued and allowed rain water to penetrate the roof system and intrude into the building in isolated places.

Forensic Building Science comment(s):
Although we do not know which product was used, there are many roof overlay products available that do not require the application of an additional barrier to protect from ultraviolet rays of the sun, the comment from Vertex is not attributed to any specific product or any referenced standard. Also, most of the products come with performance based warranties. Our experience is that the warranties are for a range of 10 to 15 years, which is longer than when the coating was applied on this roof. There is also no history of leaks we are aware of prior to the application of the coating. Alligatoring is symptomatic of a flood coat that is typically applied "too thick" but does not definitively result in a leak. It is our opinion that the alligatoring is not the cause of the loss here due to the close tie in time to the reported interior water damage to the storm event.

3.7 *The liquid applied white reflective coating is commonly applied to extend the service life of an unprotected BUR, as well as to mitigate chronic leaks. We observed evidence of ultraviolet deterioration in the flood coat and membrane below the recently applied coating. The white coating has weathered over the time it has been in place, has become brittle, and tracks the alligator cracking in the top flood coat on the built-up roof plies. Nevertheless, there is no evidence that the white top surface coating was damaged by hail.*

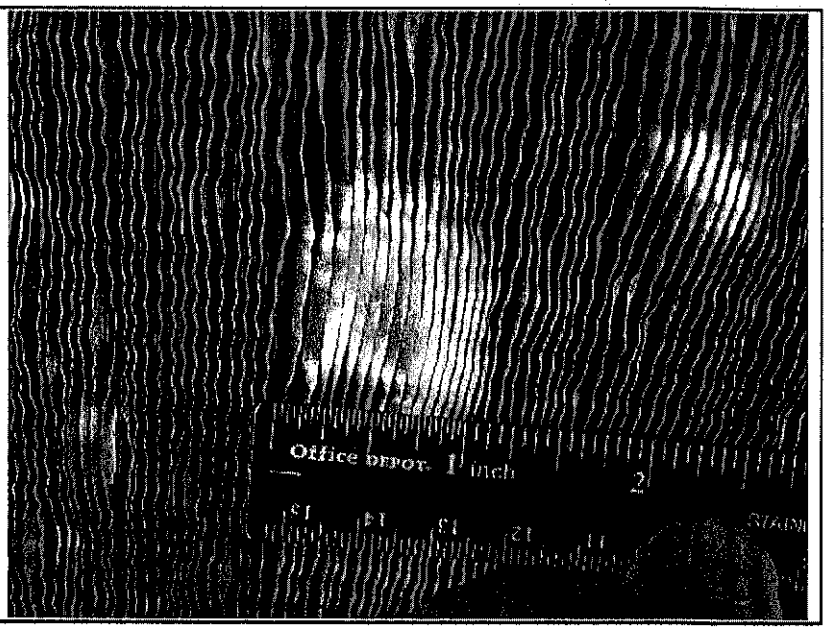
Forensic Building Science comment(s):
The coating, as of 2013 is not "recently applied." The coating dates from 2010, see historical satellite imagery discussion above. See our comments below section 3.5. Also, we observed hail damage to the white top surface coating and the BUR underneath it.

3.8 *Hail spatter marks typically occur on the tops of metal equipment where hail has removed oxidation and/or organic growth (algae) and/or sediment from the surfaces of the equipment. Spatter marks are a good indicator of the size of hail stones impacting the roof surfaces, and the direction of fall. The observed spatter marks on the breaker box indicate the size of the recent hail was less than 1-inch in size.*

Forensic Building Science comment(s):
The thickness of the metal materials impacted, the density of the hail and the angle of the impact affect the size of the indentation or spatter. Impact marks to air conditioner condenser coil fins are generally considered the most reliable way to determine hail size that impacted it. According to Haag Engineering, the impact marks to the fins are an average of 85% of the size of the hail stone.

There are scattered dents in the aluminum fins of condensing coils on several air conditioning (HVAC) condenser units, and on the condenser fins of the RTU. The largest dents measured no more than 1 inch wide (Photographs 22), indicating the possibility of hail impacts of approximately 1-1/4 inch in size. There are small (less than 1 inch) dents on the tops of light gauge aluminum vent stacks (Photo 25). There are hail spatter marks on the tops of air conditioner condensers, measuring approximately 1/4 inch in size. There are hail spatter marks on the side of an electrical breaker box at the RTU, measuring approximately 1/4 inch in size (Photograph 23).

Source: Vertex report, page 3.

Photograph: 22 **Description:** Close view of typical impact mark on the RTU coil fins.	

Source: Vertex report.

We observed many impact marks on the fins greater than 1" in size. Also, see K Construction photos of A/C units. Vertex failed to supply photos that accurately represent the size of the hail. For example photo 22 in their report shows only a horizontal measurement of the impact damage as 1-1/16" in size. When the same impact is measured vertically the impact mark is in excess of 1.75 inches indicating probable 2" plus size hail. Note: This is before the hail events of 2014 and 2015.

3.9 *Observed denting on the air conditioning condenser fins are on west facing and south facing coils, but the predominant damage to fins is to the west facing surfaces. The dents display a random pattern which is indicative of a normal configuration of hail fall, but the damage could have been caused by hail at times* [sic] *in the past. It was not possible to determine when the dents were made. Nevertheless, the measured sizes of the denting are no more than 1-inch across. Because of their shapes, there are some dents in coil fins which were caused by mechanical means, not by hail.*

Forensic Building Science comment(s):

See our comments in section 3.8 above. When the same impact is measured vertically the impact mark is in excess of 1.75 inches indicating probable 2" plus size hail. The majority of the damage that we observed to the fins was from hail, not mechanical damage. At least one of these units was installed circa 2010, and has damage to the fins despite the "hail guard," see Figure 62, 7/8/15. The damage photographed in the Vertex report cannot be attributed to 2014 or 2015. The damage to the roof vents observed in the Vertex report are not consistent with 1.5" diameter hail from 2012.

3.10 *The dents on the aluminum vents are cosmetic not functional damage, and thus do not warrant replacement of the vent tops. Moreover, the size of the denting on the vent tops is relatively small, indicating the impact substances were less than an inch in size.*

Forensic Building Science comment(s):
We would agree the hail diameter is less than 1.5" size, but review of SWDI as well as the damage to the HVAC coils suggests hail in the range of 1" to 1.25".

The damage potential of hail and severity of the dent varies with the size of hail as well as the density. Dents to flat metal surfaces, allows water to pool and corrode the metal prematurely. Also, this is not the pre-loss condition of the materials, and we believe a good visual appearance is a function of all exposed building products. All materials that exhibit impact damage should be removed and replaced. The lack of dents in at least one area appears to be a replaced piece of roof coping (Photograph 20).

3.11 *The multiple scattered and observed blisters in the BUR covering are evident under foot traffic. When moisture gets between the plies of a BUR and vaporizes, the expansion pushes up and forms a raised blister in the membranes. Then when foot pressure is applied, the blister will usually rupture the roof and create a path for water. The blisters on the roof are pre-existing conditions and predated the hail storm.*

Forensic Building Science comment(s):
Blisters exist on the roof, but we do not believe that they are severe enough to cause water intrusion. Even if they are, a blister from construction would have a limited amount of water. A blister from water entering after construction (i.e. a leak) would be a more plausible source for water intrusion due to the natural resupply from rainfall.

3.12 *There are several places where the roof is breached with HVAC lines, vents and other appurtenances. These breaches through the roof are all difficult to seal from rain water penetration. There are no pitch pans or other form of raised protection to keep water out of the penetrations, thus they are likely places where rain water has probable access through the roof.*

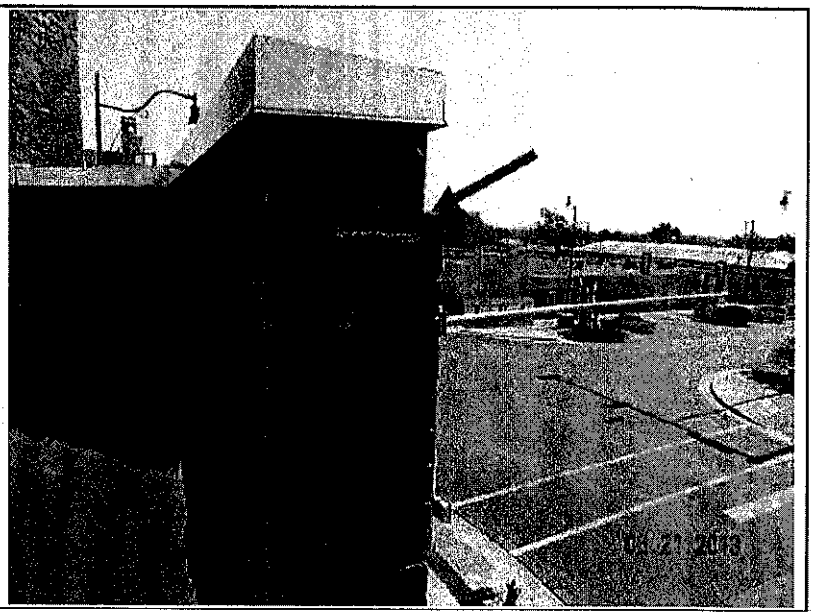
Forensic Building Science comment(s):

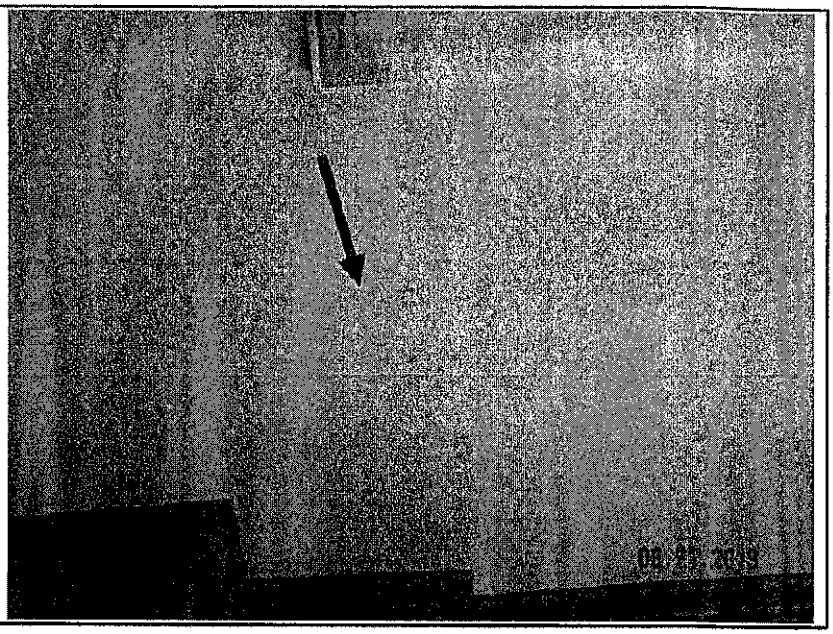
Vertex makes no effort to correlate alleged roof deficiencies with actual water damage inside the building which is essential to supporting this opinion.

During our infrared scanning and moisture mapping, we found no water intrusion correlated to these alleged breaches. The building is over 60 years old. Construction requirements for roof pitch and drainage are much different now than they were when the building was constructed. Improvements for drainage will have to be made when the roof is replaced.

3.13 *The missing brick on the south end of the elevated brick parapet at the northeast corner of the building likely allows rain water to penetrate into the building and is possibly the source of the observed ceiling damage in the front northeast part of the news office.*

Forensic Building Science comment(s):
Vertex doesn't definitively opine the opening is the source of the ceiling damage in their Photograph 30.

Photograph: 27 **Description:** South edge of the elevated parapet at northeast corner of the building. Note the bricks missing.	

Photograph: 30 **Description:** View of ceiling damage inside the news office, suite 300, directly under the elevated parapet and missing bricks from photos 27 & 28.	

Photograph 30 shows narrow cracks in the sealing near this area but no signs of actual water damage or stains are visible in the photo.

3.14 *The ponding of air conditioning condensate from the RTU and inadequate drainage that permits water to stay on the roof for extended periods of time further deteriorates the roof materials faster than normally. Chronic moisture conditions must not be allowed to continue and must be removed from a roof.*

Forensic Building Science comment(s):
Pooling is the correct term. Ponding is associated with a defectively constructed overly flexible roof. This pooling is a typical condition for a roof of this age when air conditioner units are running in the warm months. We did not see, nor are we aware of reports of water intrusion below these units and/or areas where the water evaporation zones exist. No leaks are associated with these locations in the Vertex report.

3.15 *The several air conditioner condensing units on the roof which are sitting directly on top of the roof surface (not sitting on 4x4 wood blocks) trap rain water underneath and allow more rapid deterioration of the roof system.*

Forensic Building Science comment(s):
See our comments in previous section. No leaks are associated with these locations in the Vertex report.

3.16 *Because of the many high ceilings and various floor levels in the building, we were not able to access air conditioning equipment above the ceilings inside the five suites. Some of the equipment, such as blowers, evaporator coils, refrigerant piping and ducting, are located above the ceilings. Many times condensation will form on cold surfaces of coils, piping and ducts and then collect and fall on*

ceiling tiles, thus leaving stains that are often mistaken for roof leaks. Since the locations were widespread we could not verify the source of each water stain on ceiling tiles.

Forensic Building Science comment(s):
Vertex performed no inspection in arriving at this speculative conclusion. Even so, if the water damage is from condensation, it would appear during every cooling season. The water damage in this case is reported following the storm event, only. The idea that this is condensation is discarded due to lack of engineering reasoning and poor inspection practices.

We inspected the space in between the drop ceiling and the roof at the interior and did not find any signs of water related leaks from the HVAC units and/or sweating ductwork. Infrared scanning from the interior showed anomalies that were inconsistent with damage caused by leaking AC units or condensation dripping from ductwork, and more consistent with random damage from hail.

3.17 *Water damage to the interior of the building is long term and ongoing and pre-dated the recent storm. Water intrusion along the south exterior wall of the building is likely due to leakage from the gutter system over time during the life of the building, and not because of hail damage to the roof.*

Forensic Building Science comment(s):
There is no methodology or stated reasoning in arriving at the "long-term" dating of the water damage.

This "long-term" speculation is inconsistent with the leak history told to Forensic Building Science by the building Owner. There is no indication in the Vertex report that they interviewed the owner to obtain a service history on the roof. Vertex poorly inspected the interior of the building by not inspecting the ceiling spaces for the source, nor did they take into account the timing of reports of water intrusion from the people at the property.

It should be pointed out that a span of approximately two years has passed in between the time that Vertex inspected the building and the time of our inspection. If Vertex were to revisit the property now, it is likely that they would see more signs of water intrusion inside the building. Water intrusion to the interior occurs during heavy rains only. This is consistent with the concrete deck holding water back during intrusion (absorbing and emitting as water vapor over time as it dries out). Also, the Hail Facts report noted hail at the location of this property after the initial date of loss and after Vertex visited the property. The notable dates are May 7, 2014 and May 26, 2015. Newer damage likely exists now that did not exist when Vertex viewed the property in 2013.

4.0 **Causation Statement:**

Based on our inspection of the interior there is extensive water-damage that must be remediated. Based on our education, training and expirience and upon a reasonable degree of engineering certainty, it is more likely than not that the observed damage is a result of the subject storm event.

Based on the extent of interior water damage reported following the 2013 event and our observations of the damage to top side surfaces (partly in the Vertex report), it would be our opinion the roof should have been replaced following the damage from the 2013 storm.

While additional storms have occurred since the initial event and prior to our inspection, on the reported date of loss there was sufficient hail and wind to cause the above-referenced damage. Failure to address the storm-damaged roof at the property has resulted in additional damage due to water intrusion. Based on our inspection of the roof it is damaged as a result of the storm event and must be completely replaced.

5.0 **Conclusions:**

5.1 At the issuing of this report, we have received no information indicating the roof was leaking prior to the hail event. Damage to this structure from the hail and any subsequent events and precipitation includes the following:

- Loss to the roof system service life and water resistive properties.
- Potential loss of energy efficiency in roof system placing larger demand on cooling system, shortening expected service life of units. Strain on units with hail damage may reduce their life.
- Direct damage to the HVAC units.
- Water damage to acoustical ceiling tiles.
- Interior plaster and drywall water damage to walls and ceilings.
- Damage to carpet and subfloor.
- Damage to roof metals (flashing, copings, vents, penetrations_
- Water damage to below deck insulation.

5.2 Hail damage created breaches in the roof envelope that led to subsequent water entry and water damage to interior finishes. Water intrusion is now observed only after large rain events which is consistent with the thickness of the membrane and the concrete roof deck holding back and absorbing water which is then released gradually as water vapor as the materials dry. Entry points for rain on the exterior and exit points for water on the interior are impossible to connect making patching infeasible with no expectation of success without multiple attempts. Water intrusion through the roof membrane was confirmed during the moisture mapping and coring.

5.3 The only effective way to dry these materials out is to remove them. Regardless of extent of moisture held in the porous materials and the extent of water intrusion into the roof, reconstruction of the roof will have to comply with current codes for insulation and roof slope.

5.4 Based on our findings and the size of the roof, the overall amount of water penetration into the roof system is extensive. It is not feasible to cut out the wet areas and add new roofing materials because the roof currently has two plus layers and this type of repair cannot be done under the current IEBC codes, and also violates manufacturers installation requirements. Absent detailed roof surveys to determine locations of wet and damaged areas on the roof partial repairs will fail. Damage due to water intrusion may be distributed much farther than the locations seen on the interior ceiling tiles, due to the relatively low slope of the roof.

5.5 The roof substrate is not consistently dry. Many roofing product manufacturers require the roof to be dry prior to covering with new products. Installing new roofing materials over wet areas will result in a significantly reduced life expectancy of the new product. Installation of a new roof system over a wet concrete deck is not allowed and will complicate and add cost to the reconstruction.

5.6 Covering the roof with waterproof foam (i.e. spray foam) will lock moisture into the roof. The only way this water can escape would be to travel downward into the deck surface and through onto the acoustic ceilings, which it has already demonstrated it will do. Not all water will escape, and will increase damage.

5.7 Water intrusion damage should be fully traced. We believe it will be more expensive (due to multiple call backs and repeated 'trial-and error' attempts) to fully trace leaks than it will be to replace the roof assembly entirely. The plank allows water in the roof assembly to travel a significant distance before it drops through small openings.

5.8 While two additional dates of significant hail were reported in the Hail Facts report the original date of loss was sufficient to require the scope of repairs put forth by Forensic Building Science. It is likely that we viewed some damage that occurred on these dates, after the initial date of loss but in our opinion this damage while cumulative is incorporated into the initial loss in terms of the scope of repairs.

5.9 Below deck insulation (sound deadening) is compromised at numerous locations by water intrusion. Full extent of damaged materials is unknown. Accessing the insulation from above is impossible due to concrete deck. Removal of all ceilings to access damaged insulation will be required.

5.10 Any tie-in must be signed off on by a design professional or testing performed to provide equivalent performance to new work. See IBC 104.11 and 104.11.1.

5.11 Care must be taken to ensure any replacement roof or ceiling is in conformance with the existing fire-rated assemblies designed by the original architect, or a replacement fire-rated assembly must be selected and specified by a licensed architec to change it to a different system. Based on the age of construction, it is our expectation that the ceiling tile in this buiding is part of the fire-rated

assembly (joists are not sprayed with fireproofing, concrete C plank above, etc.) Vertex report has similar language (below).

Reconstruction and repairs performed at the property may be regulated, depending on scope and severity. Repair designs should be coordinated with a licensed trade contractor or specialist, Registered Architect or Professional Engineer to comply with applicable building codes and standards of care.

Source: Vertex report, "Limitations, definitions, & disclaimer"

6.0 **Requirements / Recommendations:**

We recommend a full replacement of the roof membrane. Prior to installation of the new roof system the concrete deck should be moisture scanned and dried down to meet the requirements of the roof insulation and membrane manufacturers' requirements.

Based on the findings during the limited investigation we recommend the following steps be taken.
Follow current code requirements as adopted by Oklahoma City and all manufacturer specifications and guidelines.

Contractor is solely responsible for adherence to all applicable safety requirements for work at heights.

1) Due to age of building test all suspect materials for possible asbestos, coal tar, and lead paint. Revisit scope if any of these materials are found. Encapsulate or abate, as required by law if found.
2) During work that affects access the businesses, protect pedestrians adequately from work and falling debris, tools, etc, (i.e. covered scaffolds, or similar. Such work is the means and methods of the contractor, See 1401.3, IEBC).

1401.3 Alterations, repairs, and additions. Required exits, existing structural elements, fire protection devices, and sanitary safeguards shall be maintained at all times during alterations, repairs, or additions to any building or structure.

Exceptions:

1. When such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. When the existing building is not occupied.

3) Temporarily disconnect rooftop air conditioner unit as required to remove and replace roofing under and around air conditioner. NOTE: AIR CONDITIONER MUST REMAIN IN PLACE AND WORKING IF WORK IS DONE DURING SUMMER MONTHS.

4) All rooftop mechanical units will have to be lifted and reset to replace the roof membrane. Roof hatch or units less than 10' from the roof edge should be moved or approved safety guards should have engineer sealed details and installed. Such a guard shall extend not less than 30 inches beyond each end of such appliance, equipment, fan or component. Verify with code official. See 2012 IBC 1013.6.

5) If unit is damaged from storm, remove and replace air conditioner condenser fin coils. If OEM coils cannot be obtained, or unit has damage unrelated to the storm, or is older, test unit as-is to demonstrate compliance with current energy code. If unit as-tested meets energy code, reinstall unit. If unit as-tested does not meet current energy code, comb and retest, replace coils and retest, or replace unit.

6) Remove all layers of roofing to roof deck. NOTE: IF FOUND, ASBESTOS REMOVAL AND ABATEMENT PROCEDURES MUST BE FOLLOWED. IF TESTING ESTABLISHES THEIR PRESENCE, TEST BEFORE FINALIZING SCOPE OF REPAIR/ESTIMATE.

7) Detach gutters and downspouts.

8) Allow roof substrate (concrete C planks) to dry. Moisture scan roof until it meets roofing membrane manufacturer's requirements. Roof vents have not been shown effective in the lab (See Haag Commercial inspection course book, p. 62), do not encapsulate moisture-laden materials.

9) Architect to review roof assembly requirements and items listed above and issue sealed drawings for reconstruction if existing rated assembly cannot be determined from existing construction drawings.

10) Once substrate is sufficiently dry, install base sheet.

11) Install base rigid insulation to meet current energy code (Oklahoma county, per IECC 2009 zone 3A = R20ci, contractor shall verify). Insulation requirements have changed since roof was originally installed.

12) Verify roof slope is adequate for new membrane manufacturer and code requirements (Vertex indicates 1/8" per foot, current manufacturers require ¼" per foot, code only allows 1/8" per foot for coal tar built-up roofing). Manufacturers periodically change minimum slope requirements for their products, but ¼" per foot is typical of modified-bitumen. Install tapered insulation as required to provide roofing manufacturer and code-required slope.

> **1507.10.1 Slope.** Built-up roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage, except for coal-tar built-up roofs that shall have a design slope of a minimum one-eighth unit vertical in 12 units horizontal (1-percent slope).

13) Modified-bitumen will have to be removed to expose flashing to Built-up roof for approval and re-use by building official or to replace flashing. Replacement of small modified-bitumen roof will be required in either circumstance. Ensure new application conforms with manufacturer's requirements for slope.

> **1507.11.1 Slope.** Modified bitumen membrane roofs shall have a design slope of a minimum of one-fourth unit vertical in 12 units horizontal (2-percent slope) for drainage.

14) Review of roof drainage (to include gutter size, downspout size, interior and secondary drain locations, provision of slope to direct water to drains, drain quantities and sizes, conductors, leaders, scuppers, overflow drains, etc.) shall be conducted by a licensed civil or mechanical engineer if not constructed as originally specified by a licensed professional engineer. Review, per International Plumbing code, should verify all items for 100 year hourly rainfall per P1106.1. All existing items should be reviewed and accepted or replacements designed with sealed plans issued. If existing plans can be found, this step may be eliminated if the drainage plans are constructed/reconstructed as shown on those plans and those plans were stamped by a licensed professional engineer, and are to current codes. We do not have Mechanical plans for these buildings.

15) Note: Roof drainage per IBC 1503.4, is for the number of scuppers/interior drains, secondary drains, and their required sizes, not a study of the impact of this drainage to the watershed/infrastructure.

16) Install cover board and attach per manufacturer's requirements (to protect rigid insulation from heat of built-up-roof application).

17) Replace roof jacks, furnace vents, curbs, and other roof items (more cost effective than removing, securing approval from Building Official to reinstall).

18) Replace roof flashings, drip edges (more cost effective than securing re-approval for reinstallation of materials), per 2012 IBC.

19) Install replacement roofing per manufacturer's requirements. Verify membrane meets requirements of 1504.3, 1504.3.1, and 1504.7. Fire classification of roof covering is the responsibility of the contractor. Note: Replacement roofing shall match existing roofing. This is to avoid engineering evaluation due to 5% weight change on the roof. Note: Reducing the weight creates larger uplift on the roof deck, open web steel joists, etc, and is not advised.

1504.7 Impact resistance. Roof coverings installed on low-slope roofs (roof slope < 2:12) in accordance with Section 1507 shall resist impact damage based on the results of tests conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP-52M or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.

1504.3 Wind resistance of nonballasted roofs. Roof coverings installed on roofs in accordance with Section 1507 that are mechanically attached or adhered to the roof deck shall be designed to resist the design wind load pressures for components and cladding in accordance with Section 1609.

1504.3.1 Other roof systems. Roof systems with built-up, modified bitumen, fully adhered or mechanically attached single-ply through fastened metal panel roof systems, and other types of membrane roof coverings shall also be tested in accordance with FM 4474, UL 580 or UL 1897.

Source: 2012 International Building Code.

20) Install noncombustible, weatherproof (i.e. metal) perimeter flashing per ES-1 standard and code and manufacturer's requirements, typically with a cleat into the parapet wall. (See IBC 1504.5)

1503.3 Coping. Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width no less than the thickness of the parapet wall.

1504.5 Edge securement for low-slope roofs. Low-slope built-up, modified bitumen and single-ply roof system metal edge securement, except gutters, shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with Test Methods RE-1, RE-2 and RE-3 of ANSI/SPRI ES-1, except V_{ult} wind speed shall be determined from Figure 1609A, 1609B, or 1609C as applicable.

21)

22) **Energy code requirements <u>are not final</u>. Conformance with energy code and integration of existing building systems with vapor retarders, application of sealants, flashing and other items are the responsibility of the contractor.**

23) Contractor shall remain on alert for signs of mold during repairs and construction.

24) Alternate construction techniques may be acceptable provided a licensed design professional approves and signs and stamps plans and or shop drawings for these repairs. Means and methods are the Contractor's responsibility.

25) Stability during construction is the responsibility of the Contractor. Structure is intended to be stable once all structural roof deck/sheathing and fasteners are in place.

26) Conform with any special inspection and testing schedules issued by the engineer.

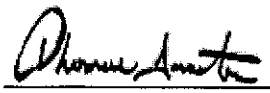
27) Remove water damaged interior materials (including below deck batt insulation in place for sound-deadening) and effect repairs pursuant to current published guidelines by the Clean Trust (formerly the Institute for Inspection, Cleaning, and Restoration Certification, or IICRC) guidelines. Verify ceiling tile being replaced does not need to be part of a fire-rated assembly, or replace with the appropriate materials.

28) Roofing will have to comply with Oklahoma City design wind speeds. This appears to be 115 mph ("ultimate" winds per ASCE 7-10/IBC 2012) mph, equivalent to 90 mph ("service" winds per ASCE 7-05/IBC 2009-). The property appears to be Exposure C, but engineer / contractor shall verify.

Discovery is ongoing. Additional testing and inspections may need to be performed and additional and/or supplemental information and opinions may be contained in future reports issued by Forensic Building Science, Inc. This report is the exclusive property of the client noted previously and cannot be relied upon by a third party. Copies of this report are released to third parties only by written permission of the client.

Please feel free to contact our office should you have any questions or need additional information.

Respectfully submitted,



September 23, 2015

Digitally signed — Date

Tom Irmiter, President, Forensic Building Science, Inc.
International Code Council Residential Building Inspector and
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